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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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10/810,965

03/26/2004

Yen-Ming Chen

TS01-0413C

9818

47390

7590

04/24/2006

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EXAMINER

TRINH, HOA B

ART UNIT

PAPER NUMBER

2814

DATE MAILED: 04/24/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

10/810,965

Applicant(s)

CHEN ET AL.

Examiner

Vikki H. Trinh

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 30 January 2006.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 29-34 and 36-38 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 29-34 and 36-38 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 26 March 2004 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Acknowledgement

Applicant filed an amendment on 1/30/06 has been considered. Claims 29-34 and 36-38 are pending in this present application.

Claim Rejections - 35 USC § 103

1. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

2. The factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

3. This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later

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invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

Initially, and with respect to Claim 29, note that a "product by process" claim is directed to the product per se, no matter how actually made. See *In re Thorpe et al.*, 227 USPQ 964 (CAFC, 1985) and the related case law cited therein which make it clear that it is the final product per se which must be determined in a "product by process" claim, and not the patentability of the process, and that, as here, an old or obvious product produced by a new method is not patentable as a product, whether claimed in "product by process" claims or not. As stated in Thorpe,

even though product-by-process claims are limited by and defined by the process, determination of patentability is based on the product itself. *In re Brown*, 459 F.2d 531, 535, 173 USPQ 685, 688 (CCPA 1972); *In re Pilkington*, 411 F.2d 1345, 1348, 162 USPQ 145, 147 (CCPA 1969); *Buono v. Yankee Maid Dress Corp.*, 77 F.2d 274, 279, 26 USPQ 57, 61 (2d. Cir. 1935).

Note that Applicant has burden of proof in such cases as the above case law makes clear.

4. Claims 29, 31, 37-38 are rejected under 35 U.S.C. 102(b) as anticipated by or, in the alternative, under 35 U.S.C. 103(a) as obvious over Marrs (5,795,818).

As to claims 29 and 37-38, Marrs discloses a solder bump for interconnection of a flip chip device comprising a semiconductor surface 501 (fig. 8, col. 8, lines 19-20), a passivation layer 601 (fig. 8) over said semiconductor surface 501; at least a contact pad 501B (fig. 8) created over the semiconductor surface 501; the passivation layer 601 exposing said at least one contact pad 501B; an UBM 502 (fig. 8) created over the at least one contact pad 501B (fig. 8), a lateral dimension of the UBM layer 502 being limited to be within lateral dimension or being limited to a size approx. the same as lateral dimension of the at least one contact pad 501B; and at least one solder compound 312 (fig. 8) overlying the UBM layer, wherein the solder compound

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comprises a flat top (fig. 8) surface and convex sidewalls (fig. 8) , wherein the top surface is greater than the bottom surface (fig. 8) before connecting to other components. Note that the substrate 501 is made of silicon material which is a semiconductor material (col. 8, lines 19-20).

As to the grounds of rejection under section 103(a), how the top surface and the bottom surface are size, either before or after connecting to other components, pertains to an intermediate process step which does not affect the final device structure. See MPEP § 2113 which discusses the handling of "product by process" claims and recommends the alternative (§ 102 / § 103) grounds of rejection.

As to claim 31, the UBM layer 502 (col. 9, lines 5-10) comprising a plurality of sub-layers of different metallic composition.

5. Claims 30, 32-34, and 36 are rejected under 35 U.S.C. 103(a) as being unpatentable over Marrs, as applied to claim 29 above, in view of Beddingfield (5,977,632).

Marrs discloses a solder bump for interconnection of a flip chip device comprising a semiconductor surface 501 (fig. 8), a passivation layer 601 (fig. 8) over said semiconductor surface 501; at least a contact pad 501B (fig. 8) created over the semiconductor surface 501; the passivation layer 601 exposing said at least one contact pad 501B; an UBM 502 (fig. 8) created over the at least one contact pad 501B (fig. 8), a lateral dimension of the UBM layer 502 being limited to be within lateral dimension or being limited to a size approx. the same as lateral dimension of the at least one contact pad 501B; and at least one solder compound 312 (fig. 8) overlying the UBM layer, wherein the solder compound comprises a flat top (fig. 8) surface and convex sidewalls (fig. 8) , wherein the top surface is greater than the bottom surface (fig. 8) before connecting to other components. However, Marrs does not explicitly teach that the UBM has a layer of chromium followed by a layer of copper followed by a layer of gold.

Beddingfield discloses an analogous device having an UBM 22, 24 (fig. 5) comprising a layer of chromium followed by a layer of copper followed by a layer of gold (col. 3, lines 48-51), wherein the UBM is positioned over the passivation layer 16 and at least one contact pad 12 (fig. 5).

Therefore, as to claim 30, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the invention of Marrs with the UBM has a layer of chromium followed by a layer of copper followed by a layer of gold, as taught by Beddingfield, so as to protect against the corrosion of the aluminum pads (col. 3, lines 45-50).

As to claim 32, Beddingfield teaches the passivation layer has a plurality of passivation layers 16, 18, 20 (fig. 5).

As to claim 33, Beddingfield teaches the plurality of passivation layers 16, 18, 20 (fig. 5) are photosensitive polyimide (col. 3, lines 5-10).

As to claim 34, Beddingfield teaches the at least one contact pad 12, 13 (fig. 5) being electrically connected with "a" semiconductor device with at least one conductive line of interconnect or with one conductive contact point (fig. 5)

As to claim 36, Beddingfield teaches that a seed layer 18, 20 (fig. 5) is deposited over the patterned layer of passivation 16 (fig. 5).

Response to Arguments

6. Applicant's arguments filed 01/30/06 have been fully considered but they are moot in view of the new rejection.

Conclusion

7. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire **THREE MONTHS** from the mailing date of this action. In the event a first reply is filed within **TWO MONTHS** of the mailing date of this final action and the advisory action is not mailed until after the end of the **THREE-MONTH** shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than **SIX MONTHS** from the date of this final action.

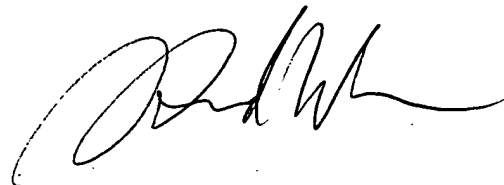
Any inquiry concerning this communication or earlier communications from the Examiner should be directed to Vikki Trinh whose telephone number is (571) 272-1719. The Examiner can normally be reached from Monday-Friday, 9:00 AM - 5:30 PM Eastern Time. If attempts to reach the examiner by telephone are unsuccessful, the Examiner's supervisor, Mr. Wael Fahmy, can be reached at (571) 272-1705. The office fax number is 703-872-9306.

Any request for information regarding to the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Also, status information for published applications may be obtained from either Private PAIR or Public Pair. In addition, status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. If you have questions

pertaining to the Private PAIR system, please contact the Electronic Business Center (EBC) at 866-217-9197 (toll free).

Lastly, paper copies of cited U.S. patents and U.S. patent application publications will cease to be mailed to applicants with Office actions as of June 2004. Paper copies of foreign patents and non-patent literature will continue to be included with office actions. These cited U.S. patents and patent application publications are available for download via the Office's PAIR. As an alternate source, all U.S. patents and patent application publications are available on the USPTO web site (www.uspto.gov), from the Office of Public Records and from commercial sources. Applicants are referred to the Electronic Business Center (EBC) at <http://www.uspto.gov/ebc/index.html> or 1-866-217-9197 for information on this policy. Requests to restart a period for response due to a missing U.S. patent or patent application publications will not be granted.

Vikki Trinh,
Patent Examiner
AU 2814

A handwritten signature in black ink, appearing to read 'H. Weiss', with a stylized, flowing script.

**HOWARD WEISS
PRIMARY EXAMINER**